PATENT SPECIFICATION

Convention Date (Switzerland): Aug. 26, 1939. **543,398**

Application Date (in United Kingdom): Aug. 23, 1940. No. 13371/40.

Complete Specification Accepted: Feb. 24, 1942.

COMPLETE SPECIFICATION

Improvements in or relating to Looms for Weaving

We, SULZER FRÈRES SOCIÉTÉ ANONYME, a Company organised under the Laws of Switzerland, of Winterthur, Switzerland, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to looms for weaving of the type in which the weft threads are cut and their ends are interturned to form the selvedge. The object of the present invention is to provide an improved method and means for turning into the shed the cut ends of the weft threads.

In the improved method according to this invention the cut ends of the weft threads are turned into the shed by the action of one or more gas currents, for example currents of air or steam. In this method a gaseous current first turns the end of each weft thread substantially at right angles to the main part of that thread and secondly the cut end of the thread is turned into the shed by the action of a second current of gas. The improved loom construction for carrying out this method comprises in combination means for delivering the currents of gas, for example air or steam, adjacent to the edge of the fabric as it is being woven, and means for controlling and directing these gas currents so that they will act on the cut ends of the weft threads and turn them into the shed.

In one arrangement there is combined with one or more jet nozzles disposed adjacent to the edge of the fabric as it is being woven, means for intermittently delivering through each such nozzle a jet of gas which acts on the cut end of each successive weft thread in a manner which will cause this end to be turned into the shed. One or more of the jet nozzles may be movably mounted so as to permit the direction in which flows the gaseous current associated with this nozzle to be changed. Two jet nozzles may be mounted adjacent to the edge of the fabric, these nozzles being so positioned and the flow of gas from them so controlled that the gas jet from one nozzle will turn the end of the weft thread in a direction substantially at right angles to the main part of that thread as it lies in the shed, while the gas jet from the second nozzle will turn the cut end of the weft thread into the shed. In such an arrangement there may be a third jet nozzle so positioned and the gas flow therein so controlled that this gas jet will act on the cut end of the weft thread after it has been turned into the shed with a beating-up effect by pressing that end of the thread into the apex of the shed.

In yet another arrangement a gaseous current may be caused to act by suction on the cut end of each weft thread and afterwards a jet of gas under pressure acts on the same weft end. By the suction the end of the weft thread will be turned at right angles to the main part of that thread and in the direction from which the warp threads are coming and afterwards this thread end will be turned into the shed by the gas jet.

A gas chamber may be arranged between each jet nozzle and a valve which controls the gas flow to that nozzle. In such an arrangement there may also be a control valve disposed adjacent to the nozzle. Means may be provided for a liquid to be carried, for example as a spray, by the gaseous current from at least one of the jet nozzles so that this liquid will be delivered with the gas jet as it acts on the ends of the weft threads. There may be a regulating valve or an orifice diaphragm arranged in the piping through which the gas flows to one or more of the jet nozzles.

The gas which acts on the cut ends of the weft threads is conveniently supplied by a pump of the piston and cylinder type actuated by the mechanism which drives the loom. The action of the gas currents on the ends of the weft threads is then controlled by one or more valves operated directly or indirectly by the pump and in association with the movements of the piston. The pump may be constructed and arranged so that it will act on the one hand as a compressor to deliver gas under pressure to one or more jet nozzles and on the other hand to act also as a suction

[*Price* 1/-]

Price 7s 6d

Price 4s 6d

pump to cause a suction effect on the cut ends of the weft threads. This pump may be actuated by the mechanism which drives the loom through a coupling which is separate from the coupling between that mechanism and the loom.

The accompanying drawings illustrate diagrammatically alternative arrangements for carrying the invention into practice. In these drawings—

Figure 1 shows in perspective an arrangement comprising two jet nozzles through which compressed gas, for example air, is delivered so as to act on the cut ends of the weft threads.

Figure 1*a* is a plan showing an arrangement in which only one jet nozzle is employed.

Figure 2 is a plan showing an arrangement in which there are three nozzles which deliver gas jets which act in succession on the cut ends of the weft threads.

Figure 3 is a plan of an alternative arrangement of jets.

Figure 4 is a view showing in a vertical plane the arrangement illustrated in Figure 3.

Figure 5 is a sectional view in a vertical plane normal to the direction of the warp threads showing the arrangement illustrated in Figures 3 and 4.

Figure 6 is a side elevation showing an arrangement in which the cut end of each weft thread is first acted on by suction and afterwards by a jet of compressed gas.

Figure 7 is a plan of the arrangement shown in Figure 6.

Figure 8 is a plan showing a modified arrangement associated with a gas jet nozzle.

Figure 9 is a view in a vertical plane normal to the direction of the warp threads showing an arrangement for supplying liquid to be carried over by a gas jet.

Figure 10 is a diagrammatic elevation showing an arrangement for driving the pump which supplies the gas which acts on the ends of the weft threads.

Figure 11 is an elevation, partly in section, showing a pump construction which may be employed in carrying this invention into practice.

The end 2 of the last weft thread 3 which has been picked will project at the side of the cloth 1 and the object of the selvedge former is to bend this thread end round into the next shed. From a nozzle 5 on the end of a pipe 4 there is blown a jet of gas 5*a* which for example may be air. This jet 5*a* is directed in the plane of the cloth 1 and in the direction from which the warp threads 1*a* and 1*b* are coming. By this air jet 5*a* the end 2 of the thread is turned in that direction. Before the shed that has now been formed closes again a stream of air directed approximately parallel to the direction of the weft threads issues from a pipe 6 through the nozzle 7, being controlled by a valve 12. This valve is controlled and actuated by a cam 8 which acts on a roller 9 on one end of a lever 11 which is pivoted at 10 and connected at its other end to the valve 12. By the action of the stream of air from the nozzle 7 the end of the thread is bent round into the shed. If desired one of the nozzles, for example in this case the nozzle 7, may be movably mounted so that the direction of the jet from this nozzle can be varied.

In Figure 1*a* is shown an arrangement in which only one nozzle 4*a* is provided. According to the nature of the selvedge of the cloth the end 2 of the thread can be blown by the gas jet from this nozzle in some desired direction, for example either into a device for cutting off the weft thread or, as is shown in Figure 1*a* so that the end of the weft thread will be bent round into the next shed.

After the pick of the weft thread 3 the warp threads 1*a*, 1*b* as shown in Figure 1 form a new shed. The control valve 102 shown in Figure 1*a* is then opened by the lever 103 carrying the roller 104 which is acted on by the cam 105. This permits gas to flow through the pipe 4*a* and the jet issuing from the nozzle on the end of this pipe will lay the end 2*a* of the thread into the newly formed shed. If the freely projecting end of the weft thread does not happen to lie exactly in the direction of the nozzle axis, it will be brought into the direction of this axis by the air stream induced by the jet issuing from the nozzle. Thus it will be ensured that the end of the weft thread is turned in the desired manner and direction.

Figure 2 illustrates an arrangement in which gas, for example compressed air, is delivered through the nozzles on the ends of three pipes 13, 14 and 15. These nozzles are arranged to deliver jets in three different directions but all substantially in the plane of the cloth. In these air pipes are control valves 16, 17 and 18 respectively actuated by cams 19, 20 and 21 as shown diagrammatically in dotted lines. These cams rotate in the directions of the arrows *a*. In the first place compressed air from the pipe 13 delivers a jet 13*a* in the plane of the cloth and in the direction from which the warp threads are coming. This jet bends the end of the weft thread over and it is then acted on by an air jet 14*a* from the pipe 14 which is directed at an angle across the warp threads. Finally an air jet issues from the nozzle on the end of the pipe 15 this jet being directed

towards the weft threads in the fabric and conveniently at an angle thereto. By the successive action of these streams of air the end 2 of the thread is turned round into the shed and tucked in to form the selvedge. The selvedge may thus be formed on one edge only or on both edges of the cloth as it is being woven.

By employing the selvedge-forming arrangement shown in Figure 2 it is possible by an air jet to press the bent-over end of the thread close in to the apex of the shed, especially in the case of an elastic yarn such for example as wool or certain silks or rayon. It is advisable not to shut at least one of the valves, for example the valve 18, until the shed is closed so that the end of the thread which has been tucked in by the action of the air jets cannot spring back out of the shed.

A further example of the selvedge-forming apparatus is shown in Figures 3, 4 and 5 where a thread guide is illustrated. In this thread guide 22 is a pipe 4 from the nozzle of which issues a stream of air or other gas which flows substantially at right angles to the weft thread 3 so that by this air stream the end of the thread is caused to turn into a direction substantially parallel to the warp threads 1*a*. From the nozzle on the end of the pipe 6 is then delivered an air stream in the direction of the weft threads, this air jet turning the end 2*a* of the thread completely round, that is to say bending it into the shed. The guide 22 may have such a form as to create an ejector action when air is issuing from the nozzle on the pipe 4. As a result of this if the end of the thread lies outside the guide it will still be bent round into the shed because of the induced air streams 24 which are created by the main air jet issuing from the nozzle on the end of the pipe 6.

In the arrangement shown in Figures 6 and 7 the turning of the end 2 of the thread in the direction of the warp threads 25 is effected by suction. When the end of the thread is free, that is to say after the pick is completed and the warp thread cut, its end is drawn into the slotted suction nozzle 26 as the weft thread is moved by beating-up from the picking position 23 to the cloth 1. In order to ensure sufficient suction at the end of the nozzle 26 a guide plate 27 shown in Figure 6 is conveniently fitted. By means of air or other gas under pressure, issuing from the nozzle on the end of the pipe 28, the end of the warp thread is bent round into the shed into the position shown at 2*a*.

In Figure 8 is shown a construction of the pipe which may be employed in some cases for conveying a gas under pressure to a nozzle. Between the nozzle 30 and the controlling valve 31, which controls the flow of gas to this nozzle, is arranged a chamber 35. This chamber is conveniently of such dimensions that after the valve 31 has been closed there will continue some flow of air from the nozzle owing to the air accumulated under pressure in the chamber 35. The time during which the air jet will continue will be determined by the dimensions of the chamber 35. The valve 31 is actuated by a cam 32 in contact with which is a roller 33 on one end of a two-armed lever 34 the other arm of which is connected to the valve. As a regulating device an adjustable throttle valve 29 may be provided if desired between the chamber 35 and the nozzle 30 so as to enable adjustment of the continuation of the air jet after closing the valve 31.

In Figure 9 is shown an atomising device in which a pipe 36 leading from a vessel containing liquid opens into a narrow part 37 of the jet nozzle 38. By means of this atomising device the weft thread may be sprayed, for example, with water in which may be dissolved some substance such as gum or sizing.

The pump which provides the stream of air or other gas may have a clutch coupling or be coupled direct to the mechanism which drives the loom. In Figure 10 is shown the driving motor 40 with the coupling 41 between this motor and the loom. The compressor 42 is directly coupled to the other end of the shaft of the motor. The compressor may be driven in such a way that it runs while the loom is operating or so that it continues to be driven by a motor even after the loom has stopped working.

As indicated, steam may be used as the gas for the necessary currents. This steam may be obtained from a central plant or from an electric steam generator associated with each loom. In some cases exhaust gas from a heating plant or some other source may be employed.

In Figure 11 is shown a type of air pump construction which may be employed, this pump being arranged to operate synchronously with the loom. In the pump cylinder 50 is a piston 51 having a rod 51*a* through which the piston is driven from the main shaft 60 of the loom. The ends of the cylinder on either side of the piston 51 may be employed respectively the one for compressing air and the other for creating suction. The air compressed in the space 52 on one side of the piston is delivered through the passage 54 into the pipe 55 which leads for instance to one delivery nozzle. The compressed air is also delivered through the passage 56 into the pipe 57 in order to supply air to one or

more other nozzles. If the plant requires suction, as for instance in connection with the devices shown in Figures 6 and 7, air is drawn into the space 53 in the cylinder on one side of the piston through the pipe 58.

The jet nozzles with their associated parts may be mounted and arranged as found convenient, being preferably fixed on some part of the loom frame.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A method of forming the selvedge of a woven fabric with the inturned cut ends of the weft threads according to which the ends of these threads are turned into the shed by the action of one or more gaseous currents.

2. A method of forming the selvedge of a woven fabric with the inturned cut ends of the weft threads according to which first a gaseous current turns the end of each weft thread substantially at right angles to the main part of that thread, and secondly the cut end of the thread is turned into the shed by the action of a second gaseous current.

3. In a loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge, the combination with means for delivering gaseous currents adjacent to the edge of the fabric as it is being woven, of means for controlling and directing these currents so that they will act on the cut ends of the weft threads and turn them into the shed.

4. In a loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge, the combination with one or more jet nozzles disposed adjacent to the edge of the fabric as it is being woven, of means for intermittently delivering through each nozzle a gaseous jet which acts on the cut end of each successive weft thread in a manner which will cause this end to be turned into the shed.

5. In a loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge, the combination with one or more jet nozzles disposed adjacent to the edge of the fabric as it is being woven, at least one of these nozzles being movably mounted so as to permit the direction in which flows the gaseous current associated with this nozzle to be changed, of means for intermittently delivering through each nozzle a gaseous jet which acts on the cut end of each successive weft thread, these gas jets causing the ends of the weft threads to turn into the shed.

6. In a loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge, the combination with two jet nozzles mounted adjacent to the edge of the fabric as it is being woven, of means for delivering gas from each nozzle, the one jet turning the end of the weft thread in a direction substantially at right angles to the main part of that thread as it lies in the shed, while the gas jet from the second nozzle turns the cut end of the weft thread into the shed.

7. A loom for weaving fabric which has the weft threads cut and their inner ends inturned to form the selvedge as claimed in Claim 6, in which a third jet nozzle is provided adjacent to the edge of the fabric with means for delivering intermittently from this nozzle a gaseous jet which acts on the cut end of the weft thread after it has been turned into the shed with a beating-up effect by pressing that end into the apex of the shed.

8. A loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge as claimed in Claim 3, in which a gaseous current acts on the cut end of each weft thread by suction and afterwards a gas jet acts on the same weft end.

9. A loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge as claimed in Claim 4, in which a gas chamber is arranged between each jet nozzle and a valve which controls the gas flow to that nozzle, with or without a control valve disposed adjacent to the nozzle.

10. A loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge as claimed in Claim 4, in which means are provided for a liquid to be carried, for example as a spray, by the gaseous current from at least one of the jet nozzles so that this liquid will be delivered with the gas jet as it acts on the ends of the weft threads.

11. A loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge as claimed in Claim 4, in which a regulating valve or an orifice diaphragm is arranged in the piping through which the gas flows to one or more of the jet nozzles.

12. A loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge as claimed in Claim 3, in which the gas which acts on the cut ends of the weft threads is supplied by a pump of the piston and cylinder type actuated by the mechanism which drives the loom, the action of the gaseous currents on the ends of the weft threads being

controlled by one or more valves operated by the pump and in association with the movements of the piston.

13. A loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge as claimed in Claim 12 in which the pump acts on the one hand as a compressor to deliver gas under pressure to one or more jet nozzles and on the other hand acts also as a suction pump to cause a suction effect on the cut ends of the weft threads.

14. A loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge as claimed in Claim 12, in which the pump is actuated by the mechanism which drives the loom through a coupling which is separate from the coupling between that mechanism and the loom.

15. A loom for weaving fabric which has the weft threads cut and their ends inturned to form the selvedge in which the ends of the weft threads are caused to be turned into the shed by gaseous currents as described and illustrated diagrammatically in Figures 1 and 1*a* or in Figure 2 or in Figures 3, 4 and 5 or in Figures 6 and 7 or in Figure 8 or in Figure 9 of the accompanying drawings.

Dated this 23rd day of August, 1940.
KILBURN & STRODE,
Agents for the Applicants.

Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1942.

[This Drawing is a reproduction of the Original on a reduced scale.]

Fig. 1.

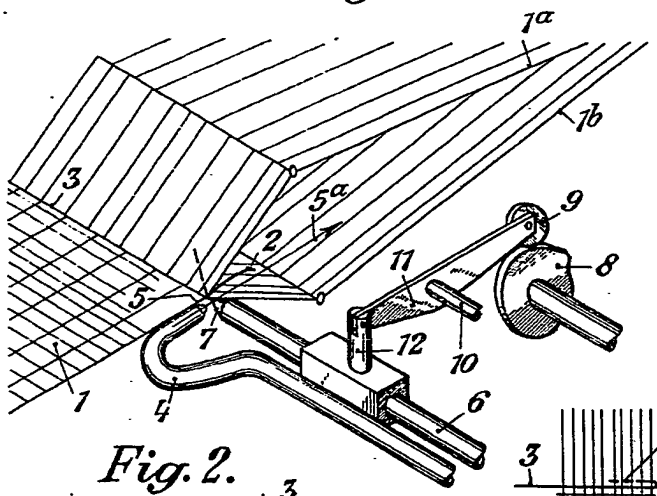


Fig. 2.

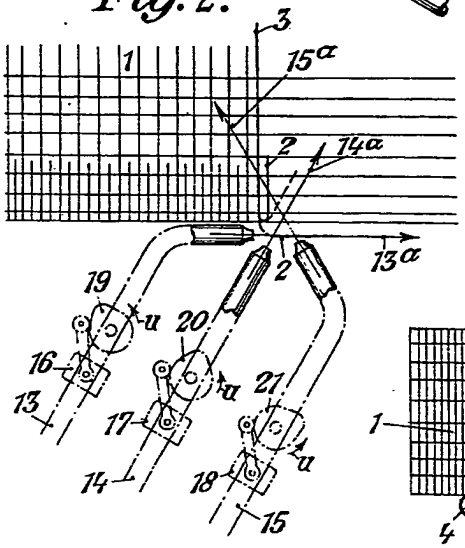


Fig. 1.a

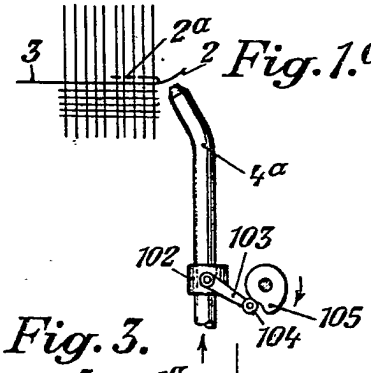


Fig. 3.

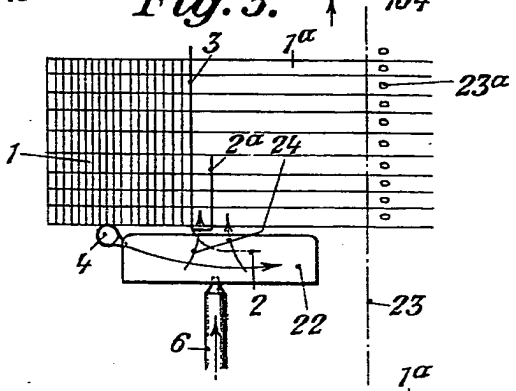
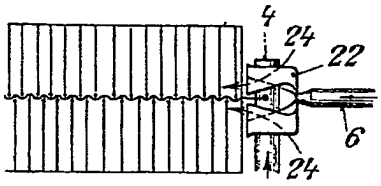


Fig. 5.



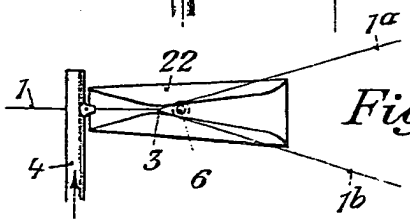


Fig. 4.

Fig. 6.

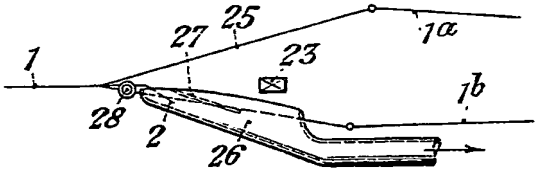


Fig. 7.

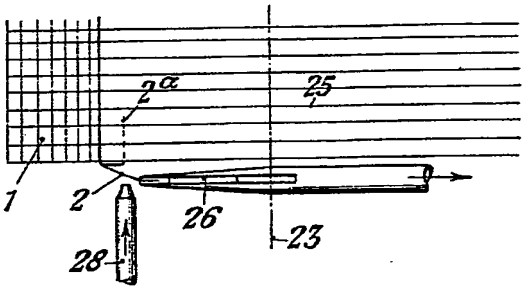


Fig. 8.

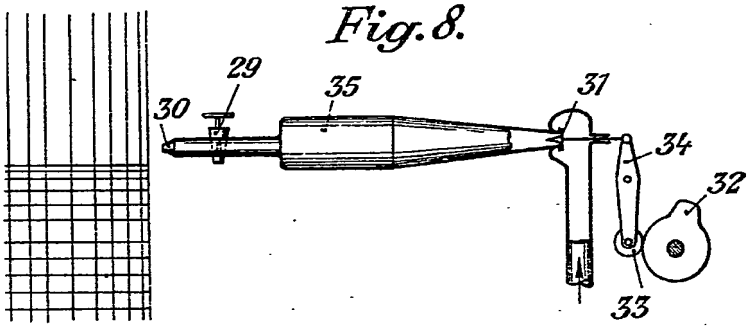


Fig. 10.

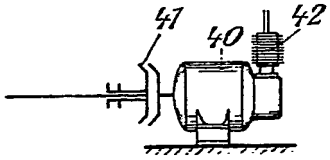
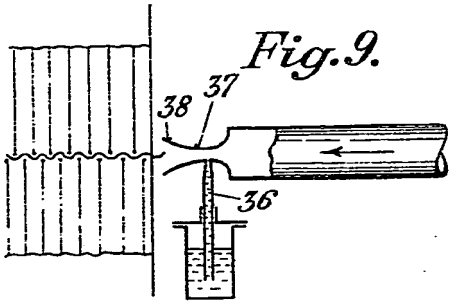


Fig. 9.



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143,388 COMPLETE SPECIFICATION

3 SHEETS

SHEET 1

Fig. 1.

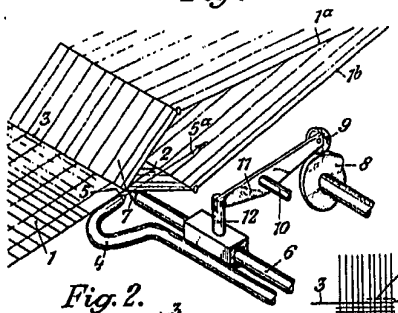


Fig. 2.

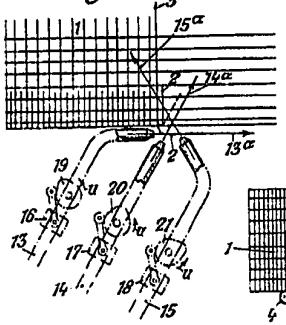


Fig. 1.a

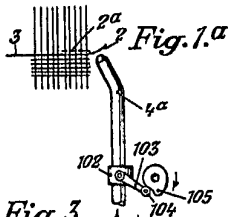
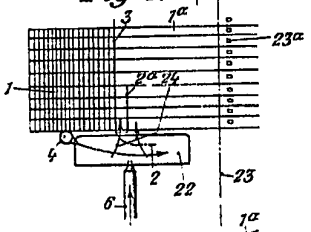


Fig. 3.



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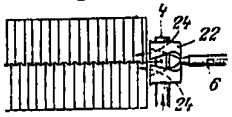

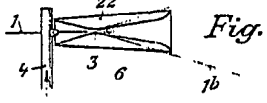

Fig. 4.

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Fig. 6.

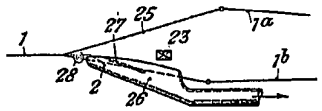

Fig. 7.

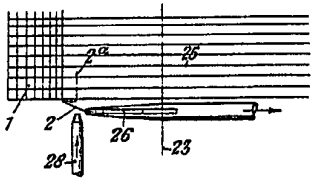

Fig. 8.

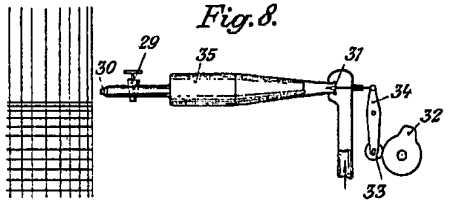

Fig. 10.

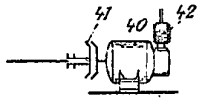

Fig. 9.

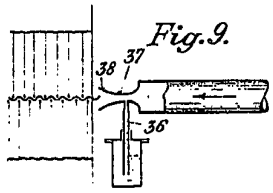

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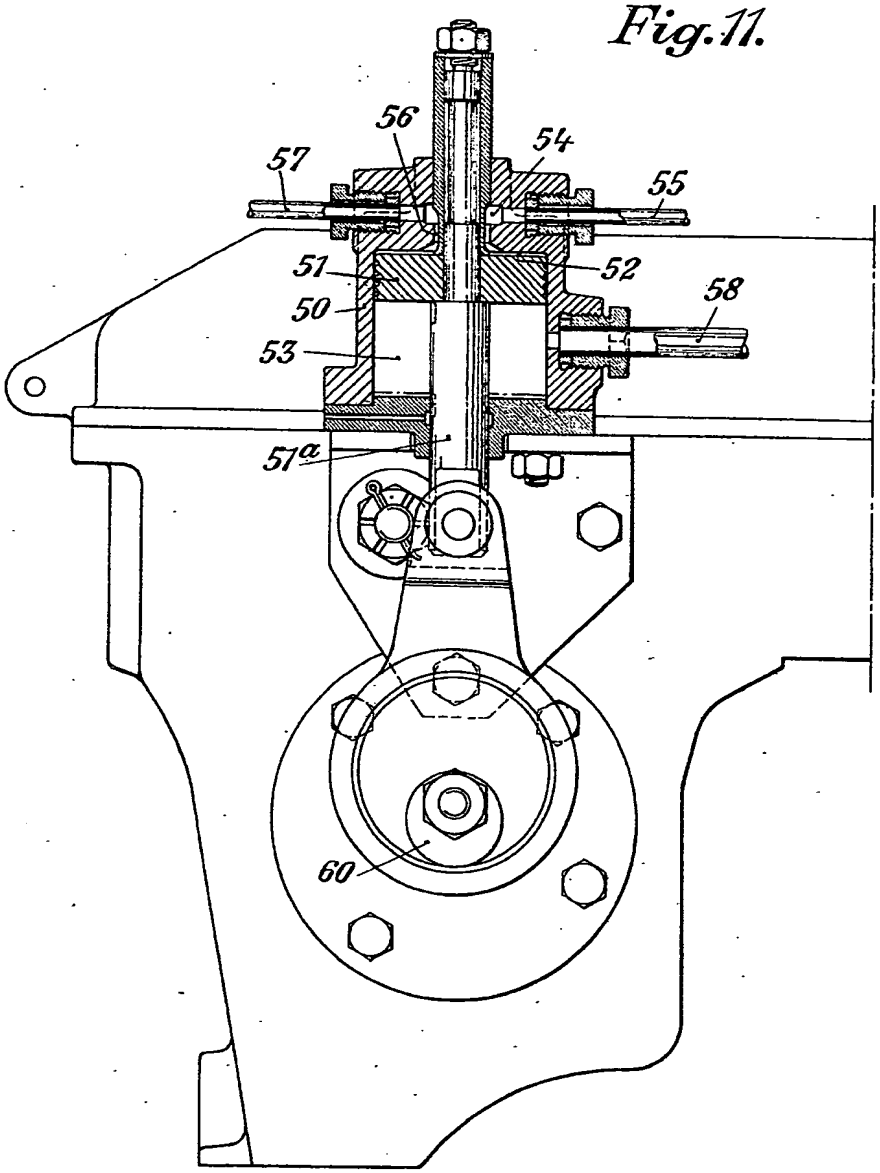
Fig. 11.



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